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COMPARISON OF TWO POLE SPACINGS FOR LOW-COST HOUSE FRAMING

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COMPARISON OF TWO POLE SPACINGS FOR LOW-COST HOUSE FRAMING

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Miscellaneous Publication 1020 gives details of the construction technique used in this pole-framing system for building houses. That publication describes prototype No. 1, which was built by a cooperator in West Virginia in 1964. It demonstrated that the pole-framing system was an economical, a sturdy, and a simple construction method.

In this building system, the roof load is supported between poles by a plate beam that extends around the

perimeter of the house. A general view of the system is shown in figure 1. The poles support the plate beam and carry the load directly to the footing. (Thus, wall panels between poles are nonload bearing and must resist only wind loads.) The framing to which the wall covering is attached plays a major role in the alignment and spacing of poles and the general construction of the house. Horizontal girts (2- by 4-inch), spaced 2 feet on center verti-



PN 2015

FIGURE 1.—Pole-framing system used in prototype No. 1.

cally, are two spans long. The joints of alternate rows are staggered to provide straight walls and a rigid frame (fig. 2). The girts are notched at each post and nailed with 16d nails to develop a positive spacing, easy alinement, and rigidity.

To determine the scope of the design and the flexibility of this

framing system, a similar structure, prototype No. 3, was build at Oakland, Md. The primary difference between the two prototypes was a wider pole spacing in prototype No. 3. (Prototype No. 1 had pole spacing of 8 feet 4 inches and prototype No. 3 had pole spacing of 11 feet.) This supplement presents a comparison of the two pole spacings.

STRUCTURAL RIGIDITY

In prototype No. 1 (pole spacing of 8 feet 4 inches on center) the poles and horizontal girts created an integral structural unit. Notched 2- by 4-inch girts caused pole spacing to be fixed and uniform. The entire frame was assembled as a free body; then it was alined and squared before the pole positions were fixed

by back filling and tamping (fig. 1 and 2). The girts attached to the poles formed a strong scaffold that could be used during the remaining construction.

In prototype No. 3, when the pole spacing was increased to 11 feet, much of the rigidity was lost. The horizontal girts sagged under rela-



PN 2016

FIGURE 2.—Horizontal 2- by 4-inch girts are two spans long. Joints are staggered on alternate poles.

tively light loads and could not be climbed upon safely (fig. 3). The weight of a man on these girts often caused the nails to split out at the pole and sometimes caused complete failure (fig. 4).

Evidence of girts sagging between poles remained even after siding was attached (fig. 5). With the 11-foot pole spacing, 2- by 6-inch girts would be needed to avoid sagging and provide desired rigidity.

EASE OF CONSTRUCTION

Construction problems were increased when poles were spaced 11 feet apart because of the less rigid framing. The frame could not be used as a scaffold; thus, a separate scaffold was needed during the rest of the construction. The poles were more difficult to aline, and slight variation in pole spacing resulted

because of sagging girts. Several girts were split and became unserviceable during construction. Straight 2 by 4's in the longer length are often more difficult to obtain. In this case the longer 2 by 4's had been stocked at the lumberyard for some time and were warped, which caused notching and fitting to be more difficult (fig. 6).



PN 2017

FIGURE 3.—When poles were spaced 11 feet apart, girts sagged severely under the weight of a man.



PN 2018

FIGURE 4.—A 2- by 4-inch girt that split because of excess load between poles spaced 11 feet apart.



PN 2019

FIGURE 5.—Sag in girts did not recover before siding was attached.

COST AND AVAILABILITY OF MATERIALS

Cost for the 11-foot pole spacing were significantly higher than for the closer spacing.

The difficulty in obtaining suitable materials for the 11-foot pole spacing was also significantly greater than for the closer spacing. The girts must span two pole spacings, and the joints must be staggered to be effective in alinement of the walls. Otherwise, a flexible joint will occur at the poles that have no

continuous members across them. The girts must be 16 feet 8 inches long for the closer pole spacing and 22 feet long for the greater pole spacing.

The 22-foot length of 2 by 4's is not available in many lumberyards and usually sells at a premium price when available. If 2 by 6's are used, the availability and cost will be even more unfavorable for the 11-foot span.

When the pole spacing is increased, the total load on the longer plate beam is increased and a heavier plate beam is required. For the same width house, the plate beam must be increased from a 2 by 8 to a 2 by 12 when pole spacing is increased from 8 feet 4 inches to 11 feet (fig. 7).

There is considerable merit in having the plate beam extend over two spans; 2 by 12's in the 22-foot length are usually not available except on special order. Thus, the per-foot cost for the plate beam materials would be increased by at least 50 percent with the greater pole spacing.

The only cost that would be decreased by increasing the pole spacing would be the cost of the poles themselves. Only two poles could be saved by increasing the span to 11 feet in a 24- by 40-foot structure. This saving is insignificant when compared with the items that increase in cost.



PN 2020

FIGURE 6.—The long 2 by 4's, which had been stocked for some time, were warped.

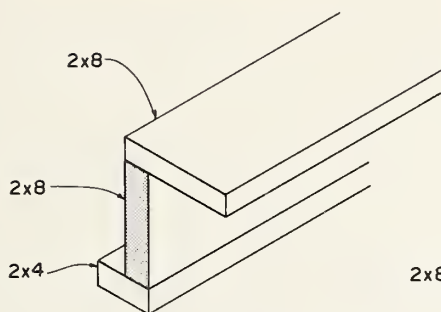


PLATE BEAM for
8'-4" pole spacing

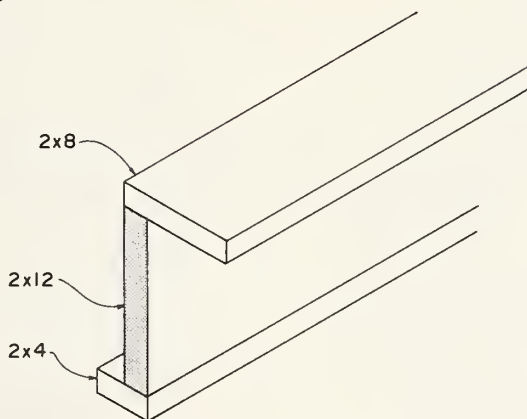


PLATE BEAM for
11'-0" pole spacing

FIGURE 7.—Plate beam requires 50 percent more wood per foot for a span of 11 feet than for a span of 8 feet 4 inches.

CONCLUSIONS

The use of pole spacing greater than 8 feet 4 inches is definitely possible, but it is not advantageous. As the pole spacing is increased, construction problems are magnified, the structural unit becomes less rigid, and the cost of framing materials goes up rapidly. If wide pole spacing is important for esthetic or

other design reasons, pole spacing can be increased satisfactorily by the use of larger sizes of framing members even though cost would increase. A large percentage increase in framing cost is generally not significant in the overall house cost when this relatively inexpensive framing system is used.



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